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The Relation of Husbandry to Animal Health*

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The connection between husbandry methods and the origin, recrudescence or spread of disease is often obvious. Thus one could suggest, among many other examples, the introduction of a specific infection or infestation through purchase of the untested carrier; the spread of infection from animal to animal because of inadequate sanitation (*e.g.*, through use of a communal water supply or of inadequately treated purchased feeding-stuffs and swill, or from failure to destroy or disinfect bedding or perches), or because of faulty handling (as by the shepherd at lambing time); the adoption of a breeding policy liable to produce defective or diseased stock, exemplified by impaired fertility in certain breeds of cattle; the failure to permit access to iron, fibre or other natural supplements to maternal milk or to artificial rations; the failure to control grazing so as to reduce the likelihood of helminth infestations such as "husk" or of nutritional disorders such as "bloat"; or the failure to remedy phosphorus, copper, cobalt and other deficiencies, or to remedy molybdenum and other excesses, in the herbage.

SOME ECOLOGICAL CONSIDERATIONS

There are, however, some more subtle but equally close relationships, the nature of which we are only just beginning to comprehend. Studies of the population dynamics of wild fauna, as the work of Elton and his school at Oxford has so clearly shown, reveal a constant tendency towards fluctuation in numbers. Stable, non-migratory populations appear to be quite the exception in nature even in ungulates. The tendency is towards periodic increases in numbers, with peak levels often amounting to "plagues," followed by an "epidemic" which wipes out the excess population and in fact causes a "crash" to a low level of population. Such cycles, which have been well worked out in the case of many rodents, are not always very regular but there can be no dispute as to their occurrence. Even in a relatively self-contained unit of population such as a colony of beavers, which are said to be almost entirely independent of the effect of short-period climatic variations upon food and water supplies, which are not normally preyed upon by carnivores, and which are not connected with the members of other colonies in any way obviously favouring the spread of epizootic disease, there would appear to be periodic enzootics sufficient to control the numbers. The nature of the "epidemic" varies from species to species: in the case of the zebra it appears to be a lungworm infestation.

Time does not permit of a detailed consideration of this phenomenon, which for those interested is discussed at length in Elton's textbooks (1930, 1933, 1935, 1942) and in the series of papers which he and his school have contributed to the *Journal of Animal Ecology* and elsewhere, except to add that the cycles can usually be correlated with environmental conditions, such as the food supply, and that fluctuations in the numbers of any one species inevitably cause changes in those of others associated with it. The immediate problem is the relationship of our husbandry practices to this innate tendency, assuming as I think we must until the contrary is shown, that it still exists among domesticated stock. Do we artificially approximate "peak" numbers by overstocking on a given farm and, if so, is the resultant disease simply that of increasing the incidence and volume of infection or infestation? Do we tend to exclude some of the natural environmental factors by our attempts—not yet entirely successful, at least in a qualitative sense—to equate the food intake over the seasons? What is the effect of hastening sexual maturity or of increasing the frequency of reproduction, as in the case of cattle managed intensively? What are the effects of combating the disease artificially or of stamping out certain infections? One thing is certain, we cannot draw too definite conclusions from remedial measures applied when an epidemic is past its height.

Brody (1945) draws a distinction between checks in population "involving crude, cruel, ravages of starvation, disease, and attack of enemies, as we find under natural conditions" and those due to "the operation of an elegantly delicate homeostatic mechanism." As examples of the latter he cites Pearl's observations upon the adverse effect of overcrowding upon egg laying in *Drosophila* and data upon the growth curve of the human population of the United States which "is moulded not by starvation, plagues, attacks of external enemies but by homeostatic mechanisms psychologic in nature, analogous in delicacy to that operating in the population of *Drosophila* confined in a half-pint bottle in the presence of abundant food, air, and absence of disease and the natural enemies." From our immediate standpoint the important fact is that the populations under consideration appear to suffer similar fluctuations, whether the limiting factor be infectious, nutritional or psychological: it is not improbable that all three contribute to the limitation of domestic animal populations and to the manifestation, under conditions of absolute or relative overcrowding, of disease (including infertility) in its widest sense. The principle of homeostasis, as expressed by W. M. Cannon and elaborated by Brody, is at work.

There are other lessons to be learned from the field of ecology, particularly from studies of populations to which the normal barriers have been broken down. As Elton (1939) has said: "The growing speed and the capacity of transport is breaking down the faunal individuality of continents and islands, formed very slowly through the eras of geological time. Wallace's zoographical realms are beginning to disappear and to be gradually replaced by the common world fauna consisting of those species that have the highest ecological competitive powers." This fact has a direct bearing upon human and animal health in cases in which the successful fauna are carriers or vectors of diseases transmissible to domestic life. Indirectly it leads to a consideration of the deliberate introduction of species and breeds into new areas, and of the general relationship of type and environment which has been so ably dealt with by Nichols (1944, pp. 166-190).

The effects of introducing unacclimatized stock are sometimes disastrous, as with European cattle imported into the tropics or with rams taken from lower altitudes up to the Andean plateau, where they are often infertile as a result of azoospermia (Monge & San Martin, 1942). The adaptability of cattle to tropical or semi-tropical environments has received serious study during recent years (Rhoad, 1938, 1942; Bischopp, 1940; Kelly, 1943; see also Nichols, 1944, pp. 47 and 115-116). It seems as if ability to prevent hyperthermism is due largely to inherent differences in the water economy of the type of animal and as if differences in grazing habits are correlated with ability to withstand tropical conditions. It is not surprising that Sir Arthur Olver and Mr. John Smith, among others, have advocated selection among indigenous stock in preference to attempts to grade up by crossing with imported stock from temperate regions.

There are, of course, many examples of highly successful importations, *e.g.*, of the Merino into Australia. In his paper to a meeting of the British Society of Animal Production in London next week Nichols (1946) will be discussing, from the standpoint of livestock improvement, the sequels to such successful introductions and to a form of spread in which a breed overruns the other local forms. Whatever advantages a particular variety may possess in productive capacity an essential feature of its utilization is the maintenance of good health status. Resistance to disease, or ability to maintain a favourable balance against disease while still yielding economically, must surely be an important, if not the most important, factor in determining the ultimate commercial prosperity of a breed. It would be interesting to know whether certain present spreads—*e.g.*, of Red Poll cattle, if the increase in the number of registered pedigree females (Donald, 1945) is in fact an indication of such—are temporary phenomena dictated by fashion or whether they represent a genuine ability to produce economically while the health status remains high.

Other ecological aspects of the husbandry-disease relationship are to be found in the parasitological field. It is not many years since we witnessed a bitter controversy over the proposition to eradicate

* Paper based on the address to a meeting of the Eastern Counties Veterinary Society at Norwich on February 19th, 1946.

deer in certain areas of Scotland in the hope of lessening the incidence of sheep tick. The present policy of big game eradication, advocated and practised by some of our veterinary colleagues in their attempts to control the tsetse fly, is opposed with equal emphasis by eminent zoologists. Problems of this kind are terribly complex and such drastic biological intervention as the wholesale eradication of species or groups, particularly if their role in the local economy is active, would appear in most instances to leave the way open for repercussions beyond man's control.

Breed or Strain Resistance to Disease

Differences in the natural disease resistance of different breeds or strains are well recognized throughout nature, but so far it has not yet been possible to make much practical use of them in the case of domestic mammals and birds. One of the difficulties was clearly indicated by Webster (1937) who found that the genetic basis for resistance of mice of one of the Salmonella group was independent of the gene or genes responsible for resistance to infection with the virus of St. Louis encephalitis. It would thus be a formidable genetical task to try to build up a strain of animals with inherited resistance to most or all of the major diseases afflicting the species, especially with the slow reproductive rate of our domestic stock. At the same time when a particular disease is of especial importance it may be well to develop or encourage resistant strains: thus certain strains of fowl (including strains of Brown Leghorns) are resistant to fowl paralysis and on that account surely merit commercial development at the present time. The recent observations of Severens, Roberts & Card (1944) upon resistance of chicks of two breeds to *Salmonella pullorum* infection and of Cameron, Hughes & Gregory (1943) on the inherited resistance of unbred Berkshire pigs to *Br. suis* may also prove of some practical value.

Breed differences indicated in our calf experiments at Cambridge are referred to below. Other unpublished data to which I should like to draw attention are those of my colleague E. P. Pollard (1945) who carried out some preliminary observations upon a group of 40 lambs representing the four categories of male and female Welsh and Clun-Welsh crosses at one of our investigational farms, on good sheep land at an altitude of between 400 and 580 feet. The results which, it must be stressed, are tentative indicate that the Welsh lambs had a lower potential resistance than the crossbreds but that the mean egg-counts of the groups become approximately equal as the infection progresses.

To quote my colleague, the difference is perhaps logical in view of the habits of the two breeds; the Welsh sheep, which normally graze over wide areas of hill pasture, would be exposed to a less intense infection than a heavier sheep like the Clun and its potential immunity mechanism would be expected to be correspondingly less.

It may seem superfluous to mention that heterosis or hybrid-vigour must not be confused with breed resistance, but in fact the practice of many farmers in suddenly introducing a new breed of bull into their herds must inevitably give good results in the F_1 generation that are not maintained subsequently. That hybrid-vigour is a factor in resistance to infections as well as to other diseases is, I think, certain and I believe that Hagedoorn's (1939, p. 265) mention of the greater resistance to feline distemper of hybrid compared with purebred Siamese cats is a good example.

The study of genetic factors in disease resistance of cattle may become greatly simplified by studies of the type now being undertaken by Professor Gert Bonnier and his colleagues at the Animal Breeding Institute, Wiad, Eldtomta, Sweden (Bonnier, 1946), who collect and utilize homozygous or "identical" twin heifers. Already they have evidence that one particular mycotic infection was selective in its attack (Hansson, 1946).

Nutrition and Disease

The relationship between nutrition and disease is simple only in the case of the deficiency conditions and the toxicities and even then there may be extraordinary complications. In the first place one must stress the fact that ruminants particularly and all other higher species, including man, so far investigated appear to depend upon the microflora of their digestive tracts for a varying proportion of their nutritional requirements (see Kon, 1945; Najjar & Barret, 1945). In cattle not only vitamins but also a considerable proportion of the protein may be synthesized in this way (see Smith, 1945) and it is interesting to note that the synthesized material has a crude chemical composition resembling that of linseed cake. Nutritional abnormalities may affect the health of the animal through the microflora and it is reported that whereas oral dosage with molybdenum will set up the symptoms of "teart" disease, parenteral injection will not (Ferguson, 1943) and that molybdenum is much less toxic for the rat than for the bovine (Teresi *et al.*, 1942). Similarly oral dosage with cobalt will correct the forms of "pine" or related syndromes in sheep associated with cobalt deficiency, whereas parenteral injection of cobalt is said to be ineffective. It would be interesting to know whether parenteral dosage of the ewe with copper is as effective as oral dosage in preventing swayback in the lamb.

We must agree with Maynard (1942) that the following practice of to-day owes much to the physiological studies of yesterday, however unpractical these may have seemed at the time, yet the translation into practice of some recent observations upon nutrition and disease is going to prove difficult. The role of nicotinic acid in the pig provides an excellent example of this. Human pellagra is prevalent in regions in which maize is the staple food and by feeding experimental diets containing a large proportion of maize it was found possible to set up comparable syndromes in the dog, in which "blacktongue" resulted, and in the pig, in which the condition bore a remarkably close clinical resemblance to paratyphoid or necrotic enteritis associated with *Salmonella suipestifer*. That particular piece of the work was carried out at the Institute for Animal Pathology, Cambridge, and there are doubtless some present who will recall the pigs concerned and their clinical and *post-mortem* features. The conditions in dog and pig were, however, dramatically caused by nicotinic acid which was soon shown to be of great therapeutic value in human pellagra. It was subsequently reported from the U.S.A. (Madison, Miller & Keith, 1939) that nicotinic acid in daily doses of 50 mg. cured field cases of necrotic enteritis and in that country there has since been a considerable sale of the vitamin for this purpose as well as some not very convincing experimental work to indicate its value in combating *S. suipestifer* infection. Hughes (1943), however, failed completely in one series of experiments to set up disease in pigs by feeding a nicotinic acid deficient diet while Worden & Slavin (1944) were successful in only two cases out of seven. Hughes attributed his failure to the presence of moulds and yeasts which he saw the pigs licking from the floor and walls of the sty. When he repeated his experiment and took care to wash down the sties with a disinfectant solution he was able to set up the disease. Wintrobe, Stein, Follis & Humphreys (1945) have now introduced a further complication: they report that when the level of protein (as casein) in the ration was raised to 26·1 per cent., the young pig remained healthy even when nicotinic acid was omitted from the diet, although weight gain was slightly impaired in some instances. These authors had no difficulty in establishing the need for nicotinic acid when the dietary protein (casein) was reduced to 10 per cent., the animals showing impaired growth, rough coat, diarrhoea, inappetence and a severe anaemia.

As already indicated there is not any clear evidence from this work in pigs of the relationship of nicotinic acid to infection with *S. suipestifer* and I understand that Blakemore was unable to find any evidence, from the few cases in which he tried it, that the vitamin had anything more than a temporary stimulating effect upon field cases of necrotic enteritis as seen in East Anglia. What is of relevance, however, is the fact that changes in the diet may exert a profound indirect effect upon the nutritional status and health of the animal. This is borne out further by American work indicating that vitamin synthesis in cattle and sheep depends upon the type of fodder (Lardinois *et al.*, 1944). This seems to be true not only for B vitamins but also for ascorbic acid (vitamin C) which so far as we know is not synthesized in the alimentary tract.

The connection between nutritional deficiency and infectious disease is not always clear, but there is good evidence in the case of the newborn calf. Howe (1921b) demonstrated that the calf when dropped was deficient in certain serum globulin fractions but that these rapidly appeared following the ingestion of colostrum. Theobald Smith and his co-workers (Smith & Little, 1922a, b; Smith, 1925b; Smith & Orcutt, 1925) found there was a high mortality rate in calves deprived of colostrum, the infection in their cases appearing always to be *Escherichia* (*Bact.*) *coli*. In the experiments begun by Blakemore, Davies, Moore & Worden in 1943 it was found that whereas experimental Ayrshire and Jersey calves deprived of colostrum invariably died early in life—the associated organism varied—the majority of Friesian calves did not, despite the fact that they were equally deficient in serum globulin and in vitamin A, another factor present in limited amounts at birth and supplied in large quantities in the colostrum, and that they could sometimes be shown by blood-culture to be infected with various strains of bacteria. A single feed of only about two litres of first day colostrum was sufficient to protect Ayrshire calves for a considerable period. This protection may have been due, as in the case of lamb dysentery (Mason, Gordon & Dalling, 1928), to the passive transfer of antibodies but it is more than probable that other factors were involved. Lundquist & Phillips (1943) at Wisconsin have stated that the newborn calf requires an external supply of both nicotinic acid and ascorbic acid (vitamin C) up till

the second or third week of life and that nicotinic acid deficiency causes scouring and ascorbic acid deficiency causes navel ill and other manifestations of a pyosepticaemia.

Vitamin deficiencies affect health not only by direct action upon the body and by influencing infection but also by interference with the utilization of other foodstuffs, including other vitamins (see Moore, 1945). It will be helpful to nutritional science and to disease studies as a whole when nomenclature and teaching permit of a more widespread appreciation of the "essential metabolite" concept put forward by Paul Fildes and now accepted widely in the field of bacterial metabolism. To quote Knight (1945), whose remarks might apply equally to animal nutrition, ". . . a given substance, required as a component of one of the essential metabolic processes, might appear in three different roles as a component of nutrients. It might appear: (1) as 'essential' nutrient, when its synthesis by the cell was so slow as to be insignificant; (2) as a growth stimulant, when its rate of synthesis was somewhat faster but still slow enough to be a limiting factor; (3) as a substance not required at all for nutrition, because the cell could synthesize it so fast it was not a limiting factor in growth. It is the metabolic process which is the essential thing and the compounds used in carrying it out are essential metabolites, *i.e.*, the substrates used for the process, or the substances which form parts (prosthetic groups, etc.) of the enzyme systems which carry out these essential reactions . . . (thus) . . . discussions as to whether or not a given substance is an essential growth factor, vitamin, etc., or not, or whether it is only a growth stimulant, promoter or accelerator, etc., are clearly sterile. What matters is to show how any given substance which affects growth plays its part." In therapeutics we are forced to assess the significance of vitamins by rather abrupt tests but it is perhaps evident from what has already been said that under different conditions of husbandry the many nutrients may affect health in various and often subtle ways.

Yet another complication in practice is the induction of secondary or conditioned deficiencies by wrongful feeding practices. "Cod-liver oil injury" in herbivores is said to result from destruction of vitamin E by unsaturated fatty acids. Mackenzie *et al.* (1941) have reported that the condition does not arise in rabbits provided vitamin E and cod-liver oil are given separately. Another example of the complex effect of vitamin deficiency upon health is the finding of Morgan (1940) who reported that whereas dogs were able to remain alive albeit at a low ebb when subjected to a multiple deficiency of three factors of the vitamin B_2 complex, the addition of one of the missing factors to the diet resulted in a prompt decline and death.

Seasonal variations in nutrition have a profound effect upon animal health. Perhaps the major task in British animal husbandry at the present time is to equate winter with summer nutrition. Metabolic disorders, particularly of the ketosis type, are prevalent in the trough period of late winter (February-March) when reserves of substances built up during the previous summer and autumn are at their lowest. This strain upon the animal is especially severe in the ewe, which is usually then in the late stages of pregnancy. Ovine pregnancy toxaemia can be set up experimentally by imposing a sudden cut in the plane of nutrition (Groenewald *et al.*, 1941), an event which may occur frequently in our hard climate. Nutritional deprivation of the foetus or young animal during winter may exert a profound effect throughout life. My colleague, Richard Phillips (1946b), has shown that, over a period of years at the College Farm, Aberystwyth, calves born in April were always at the lower end of the scale whereas calves born between October and December were on the average heavier than any other calves by 50 lb. at 300 days of age and by 100 lb. at 700 days. That post-natal influence was also marked was, however, shown by the difference between the average weight of young bulls (627 lb.) and that of the heifers (360 lb.) at 300 days of age. Another recent study by Phillips (1946a) has indicated that this seasonal trend is reflected in the numbers of casualties entering knackeries. The graph (exhibited) shows the numbers of adult cows brought to one knackery in West Wales during a four-year period. The peak occurs each time towards the end of the trough period, and the same has been found true for this class of animal in other knackeries in our area. American studies upon the growth of horses (Dawson *et al.*, 1945) and deer (Dorrian & Rasmussen, 1944) and upon the development of the reproductive tract in ewe lambs (Phillips *et al.*, 1945) provide further evidence of the harmful effect of winter.

Not only the animal but its produce shows the effect of the winter gap. The vitamin A content of milk in late winter is much lower than it is in summer or autumn, so that qualitative remedy of the animal's diet will benefit not only its own nutritional status but that of the associated human population. Whether this remedy lies in improved methods of conserving crops, or in the development of winter hardy green foods, or both, remains to be demonstrated, but it is worth noting that my colleague A. W. Davies has found that the vitamin A value of milk produced at our main investigational farm, where we concentrate upon the production of winter greens, was still as high in April, at the end of winter, as that of summer milk.

In his recent valuable textbook, cited above, Brody (1945) provides many examples of seasonal rhythms, some of which appear to be only indirectly nutritional. The egg production in domestic fowls in England reaches a peak in March-April, whereas in New Zealand it is highest in October, and in Guam, with a latitude of only 13° N., it remains relatively uniform throughout the year. Another interesting climatic variation was observed in our area by Bowen & Phillips (1947). When the Hill Ram Control Order was proposed the Plynlymon flockmasters objected to sending their rams on to the hill at the same time as the flockmasters of the Brecon Beacons, farther south, as they believed it would be too early. At a resulting conference it was disclosed that the Plynlymon rams were normally sent up three weeks earlier than those of the Beacons! The explanation was found to lie in the microclimate of the two areas. Phenological data indicated that "spring" occurred correspondingly earlier on Plynlymon so that the available food supplies permitted of an earlier lambing date.

The tissues of the body are not formed at the same relative rate of development, nerve and bone taking priority over muscle and muscle over fat. As Hammond and his school have shown, this has a profound effect on animal production. Sheep foetuses that are small as a result of malnutrition of the ewe are not mere miniatures of large ones of the same age, nor are they similar in composition to younger better grown ones of the same weight (Wallace, 1946). By the time a pig has reached 16 weeks of age the amount of muscle or lean it will lay down is determined (McMeekan, 1940-41) so that subsequent high feeding leads only to an increased deposition of fat. A check from disease during early life, *e.g.*, from necrotic enteritis, is therefore much more serious economically than a check later on.

This qualitative aspect cannot be too strongly emphasized. Any assessment of the economic significance of animal disease would be inadequate if it reckoned only with total losses and with the apparent diminution of production at the time.

Ley Farming and Animal Health

Taylor (1944) has recently reviewed the subject of alternate husbandry and animal diseases and concludes (p. 131):—

"In summarizing, therefore, it may be concluded that the diseases of grazing animals most likely to be affected by the introduction of ley farming are those caused by strongyloid nematodes. Several important factors concerned in the propagation of these diseases are liable to be influenced, some of them favourably and some unfavourably, by a change from permanent to temporary grass. The mere cultivation of the soil in itself appears to favour the increase of parasites but the introduction of a break in the continuous grazing on any one piece of ground is an excellent aid to control, so long as the interval is adequate to allow for the death of the resting stages of parasites in the soil. Wise systems of folding sheep on arable ground are an excellent safeguard against the development of worm diseases among the particular group of sheep concerned, but the ground may become heavily contaminated with infective material so that other animals, grazing the succeeding crop within the next six or twelve months, may be in danger. The breaking up of old pasture and the necessity which it entails for the alternate use of various fields by different kinds of grazing animals, with their different diseases, is certain to be beneficial. Among the most dangerous places for parasitic diseases are those convenient and much over-used crofts near to the farm buildings where calves and foals are allowed to run during the daytime. The breaking up of the herbage in these 'crofts' and the necessity which it entails for resting the ground and for the use of cleaner, if less accessible, fields will be a good thing in itself. From the point of view of parasitic worm disease too much herbage may be almost as dangerous as too little, and in facilitating a rapid change in the proportion of a farm under forage crops, alternate agriculture may be expected to minimize these dangers. The improvement of the nutritional level will also be an additional force to combat parasitism.

"Other considerations remaining equal, the rate of intake of infection varies as the square of the grazing population; the significant figure in overcrowding, however, is not 'unit area of ground per animal,' but 'unit weight of herbage per animal,' and the significant figure for parasitic disease is not 'larvae per unit area' but 'larvae per unit of nutrition.' No excessive increase of infestation need be anticipated, therefore, from the increased stock-carrying power of the temporary leys. The destruction of the thick mat at the base of much of the permanent type of herbage is also

a controlling factor in exposing the infected faeces and the developed larvae to the lethal action of sun and winds.

"The effect on ticks and tick-borne diseases will be to eliminate them completely from those few tick-infected areas into which alternate husbandry may be introduced, and although very little indeed can be said, in the present state of our knowledge, on the possible effect on bacterial and virus diseases the inferences are that, with the possible exception of anthrax, the effects will be wholly beneficial. Most of the changes, therefore, that may be expected to take place in the incidence of the group diseases of grazing animals, as a result of a more general employment of the system of alternate agriculture, are on the credit side, and if all the known precautions are observed an improvement rather than a worsening of the animal disease situation may be looked for in spite of the increased concentration of stock that is brought about by this system."

Nobody will dispute Taylor's contentions, at any rate in so far as parasitic infestations are concerned. As my colleague L. E. Hughes recently suggested, however, is it not possible that with changes in grassland management we are tending not only to eliminate certain diseases but also to introduce new ones? On reseeded pastures in Mid-Wales this past autumn he has encountered serious outbreaks of enterotoxaemia associated with *Clostridium welchii*, Type D, and has suggested among possible factors the longer growing period of the improved grasses, the consequent better conditions of the sheep and the increased amount of soil to be found near the surface.

Certainly some non-infectious or primarily non-infectious diseases are associated with good pastures. The association between the spring flush and hypomagnesaemia has long been recognized as has the association of lush pasture with bloat or hoven. Gould (1945) has stated that the disorders of cattle associated with leys and reseeded pastures fall so far into five groups, *viz.*, (1) tympanites of the rumen, (2) impaction of the rumen, (3) "allergic indigestion," (4) urticaria and (5) enterotoxaemia associated with foetid diarrhoea and recumbency. These conditions he has observed most frequently on first year leys, but also on second and third year leys. Where it has not been practicable to control these conditions by rationing the grazing, Gould has had excellent results, at any rate in autumn, from feeding hay or straw prior to turning the animals out or from making straw available on the pasture each day. Others have not always found roughage of value, although such prophylaxis is in keeping with the general belief that the new leys tend to be deficient in fibre, with experimental proof that the ruminant must have a satisfactory amount of roughage in its diet—an otherwise adequate ration which has been titurated is no longer satisfactory and leads to mild bloat.

In their recent extensive review of bloat Cole *et al.* (1945), who have a wide experience of the conditions in the U.S.A., state that in that country there have been no well authenticated cases of acute bloat on a pasture consisting solely of grasses and incriminate the leguminous components. They quote the unpublished experiments of Petersen who "found the intravenous injection of histamine produces marked bloat; and also reports bloat with what is apparently an anaphylactic shock." This fits in well with the experimental production (Kerr & Robertson, 1943) of acute tympany by the injection of foreign protein antigen prepared from *Trichomonas foetus* and with the recent claims that adrenaline therapy is effective in naturally occurring cases (Kerr & Lamont, 1946).

A further condition associated with good aftermath grazing is the pulmonary emphysema termed "fog fever" and often misdiagnozed as a pneumonia. This condition will shortly be the subject of a paper by Barker (1946) but I might note here that P. A. Mathew of Brecon has had successful results in its treatment with adrenaline.

Whatever the mechanism of these conditions and whatever the relationships to them of the fibrous and other constituents of the herbage (*e.g.*, abnormal or altered proteins, or substances capable of linking with the animal's own proteins) there can be no disputing that they are inseparably linked with husbandry methods and that their control is as much an agronomic and biochemical problem as a clinical and pathological one.

The behaviour of cattle on new leys in seeking out weeds and material from the hedgerows may be an attempt to correct fibre deficiency, but it may also of course be due to lack of other substances of nutritive value which are not present in sufficient amounts in the sward at that time. My colleague, M. Trefor Thomas, observed that at one particular grazing period last summer, on one of our rotational paddocks almost all the heads of *Centaura nigra* (hardhead or knapweed) were nipped off to a depth of three to four inches from the apex. Conversely, certain constituents of the pasture may be harmful. Thus, in Roemer & Rudorf (1942, p. 369) we find reference to the fact that teeth which are present in varying numbers and sizes in different types of cocksfoot and which contain silicic acid may cause inflammation of the mucous membrane of the digestive tract when, as sometimes appears to be the case in Germany, fodder composed entirely of cocksfoot is given. Other interesting points are those raised by Schneider-Kleeberg (1932) and kindly brought to my notice by Mr. A. R. Beddows of the Welsh Plant Breeding Station, *viz.*, that cocksfoot becomes practically unpalatable when the water table is too high and is then rejected even in the growing stage when intensive sunlight increases the palatability of certain plants. Thus in Northern Sweden and in Finland, it has been found that during the summer months *Aira caespitosa*, *Holcus lanatus* (Yorkshire fog), and *Nardus stricta* are grazed as well as the good grass, due it is said to the higher sugar content in intensive sunlight.

The detailed chemistry of pasture plants and its significance in terms of animal health and productivity is a long-term project we are just beginning at Aberystwyth. On the animal side we have already obtained evidence of interesting metabolic variations at different times of the grazing season and on change from plot to plot under conditions of controlled rotational grazing. The relationship between such variations, which are not apparent clinically, and the larger variations associated with the metabolic disorders of ruminants is one we are particularly anxious to determine.

Housing and Disease

I wish only to introduce this topic, interest in which has recently been revived by the publication of the report of the Committee on Farm Buildings (Ministry of Agriculture & Fisheries, 1945) and by the subsequent public statements of the Chairman (Sir Frank Engledow), who pleads for simplicity in design and also asks if we have not perhaps been overweighted by what he terms medical considerations to the practical disadvantage of large-scale clean milk production. His views and those of his Committee should be considered seriously from an expert veterinary angle. I for one deprecated the illustrated propaganda of the middle 1930's, stressing that clean milk could be produced under poor housing conditions. The test is not whether it can but whether in the vast majority of cases, it will be produced under such conditions—a pragmatic view which has its parallel in a consideration of the relative effectiveness (by laboratory standards) of the "holder" and "H.T.S.T." methods of pasteurization. We should apply similar reasoning to the converse argument, *viz.*, whether or not the widespread construction of elaborate buildings with every hygienic device will in fact enhance clean milk production as a whole and so justify the expenditure at one point in the cycle of a large part of the available capital.

We are still without adequate data upon the relationship of housing to health. That we often make serious errors is exemplified by, *e.g.*, the losses in young pigs during the 1930's and by such buildings as that tested by Deighton (1940). All practitioners are aware of the appalling housing situation on many farms, particularly the senseless penalization of young stock, and of the acute shortage of water supplies (Davies, 1943). Little serious attention has, however, been paid to the atmosphere within animal houses or to the physiological effects upon the animal under practical conditions. In any analysis of the effects of the housing or non-housing upon the animal we must also take account of detailed climatological data. Thus, within our West Wales area the owner of one high-yielding Friesian herd leaves out all the year round all adult animals except those which calve down between the beginning of January and the end of winter, and these are allowed out in the daytime. The farm involved lies beyond the isophenal line for April 30th, *i.e.*, it is within that area of Great Britain which includes the Scillies and part of Cornwall and has the earliest spring as judged by the flowering times of the selected plants in the phenological survey.

Those interested in these matters might well study the little-known paper of Findlay (1936) who found that in experiments at Craibstone between 1928 and 1935 cattle wintered outside in a field ate more turnip and rather less straw and gave a larger live-weight increase during the winter than those kept tied up in a byre, and might remember also Hosier's remarks to the Central Veterinary Society (Stapledon, Hosier, Taylor & Smythe, 1944) to the effect that since he had introduced this "open air dairying" the health record of his stock had been remarkably good.

Another health and production problem connected indirectly with housing is the behaviour of dairy cattle in courts. Should courts spread at the expense of byres it will almost certainly be necessary to practise dehorning on a large scale. Anyone who has witnessed the sad results of keeping intact Ayrshires in courts will find it hard to justify any other policy. In an officially sponsored farmers' newspaper, there is, indeed, strong advocation of dehorning under court conditions (*Notes for Farmers*, 1945). Indeed, there seems little practical point in permitting horn-growth in any of

our milking cattle except for financial harm resulting from the prejudice of those concerned with pedigree breeding and fancy points: the Shorthorn Society, *e.g.*, refuses to allow dehorned animals to be entered for grading up.

In conclusion, I should like to make an appeal for unity in livestock research. This and other (Lovell, 1946; Worden, 1946a, c; Worden & Phillips, 1946) attempts to discuss current problems only serve to show that animal husbandry and animal health are inseparable and that faulty husbandry is the most important factor in the genesis of those diseases of major current importance to our flocks and herds. I prefer to regard husbandry and health as parts of the same science and view with regret the practice in Great Britain and some other countries of trying to separate disease studies from those appertaining to the productive animal in good health. Such developments as are foreshadowed in the staffing of the new National Advisory Service and in the amended proposals for the operation of the Food & Drugs (Milk & Dairies) Act of 1944 emphasize the isolation and the isolationism of the veterinary profession. The sooner studies in breeding, feeding, management and disease can be integrated the better it will be for livestock production. Such integration cannot be achieved, however, while narrow professional issues separate those who have the advantage of possessing veterinary qualifications—and I think they are an advantage to all engaged in the scientific study of animal production—from those who have not. It need not be supposed that the veterinary profession is free from blame. In the U.S.A. the head of the Bureau of Animal Industry has always been a veterinarian, yet, as Buchanan (1945) recently pointed out in an address to the American Society of Animal Production, it was pressure from non-veterinarians which caused the Bureau to devote serious attention to problems other than those of infectious disease as such and of meat inspection. Professional issues are of far less social importance than the production of meat and milk and they will probably be forgotten if veterinary and non-veterinary personnel learn to work together for the common good.

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[To be continued in our next issue with report of discussion by the Eastern Counties Division, N.V.M.A.—*Editor.*]

Learning that 170 sheep on four farms in the Brampton district had died because of double dipping in frosty weather, Cumberland and N. Westmorland F.U. decided to ask the Ministry to relax the regulations.

THE VETERINARY RECORD

April 5, 1947

HUSBANDRY AND HEALTH

IN the article appearing elsewhere in this issue, and in the discussion by the Eastern Counties Veterinary Society, to be published in our next, many examples are given of the interaction of husbandry practices and the health of domestic animals. We endorse the statement of the author, who " prefers to regard husbandry and health as parts of the same science and views with regret the practice in Great Britain and some other countries of trying to separate disease studies from those appertaining to the productive animal in good health."

It is quite obvious that attempts to unravel many of the major livestock problems now confronting us call for teamwork of a high order, and that the biochemist and agronomist are important members of the team. Bloat, fog fever, and certain forms of indigestion and enterotoxaemia are important conditions that appear to be associated with the presence of chemical substances in the pasture, and their elucidation lies not only in therapeutic measures but also in a knowledge of pasture chemistry and in effective pasture management. A recent and very striking example of the relationship between pasture and animal health is afforded by workers from Western Australia[1]. A strain of subterranean clover has been developed extensively in certain areas, with the result that it has been possible to increase the rate of stocking to a very marked extent. Recently, however, very serious breeding troubles have been encountered in the sheep so pastured. The ewes conceive with difficulty, there is a high incidence of dystokia in those that do conceive, and post-parturient prolapse of the uterus is frequent. Entire males are unaffected but the wethers develop female characteristics, actually lactating and exhibiting profound histological changes in the reproductive tract. The isolation and characterization of the oestrogenic substance present in the clover is awaited with interest, but meanwhile the sheep industry of the region has suffered a severe blow.

There have been other suggestions[2] that herbage may contain substances having endocrinological effects upon mammals. The possible presence of such biologically active substances opens up a whole field of research that intimately affects both the agronomist and the veterinarian. It does not seem beyond the bounds of possibility that the " spring flush " in milk yield and certain disorders occurring in cattle during the same season are both associated with the presence of hormone-like factors in the herbage. Pasture design in the past has been concerned mainly with such factors as establishment, persistency, association between different pasture species, length of ley and the amount of keep offering at different times to the grazing animal. In future it is likely that effect upon animal health will be a serious consideration.

Winter feeding and housing are other subjects of prime importance in the study of animal health. The work of Phillips[3] provides a clear indication of the drastic effect of winter upon production and upon casualties in livestock. Late winter is a critical period for the livestock owner and it is difficult to dissociate disorders occurring at that time from current defects, qualitative as well as quantitative, in available rations. The effect of housing upon health is a complex problem about which very little is understood, but it is quite clear that, in certain circumstances at least, even high-yielding dairy cows may be kept outdoors to a far greater extent than has usually been considered desirable in Great Britain.

Feeding, breeding and general management have a profound effect upon health status, and conversely the question of health should be taken into account in every policy affecting livestock. Elimination or control of infectious disease will not remove all threats to animal health, for losses of condition and even of life may result from disorders that are intimately associated with husbandry practices and in which infection, even if present, plays but a secondary role. The implication of such facts is clear. The veterinarian is not concerned solely with disease and veterinary knowledge should be taken into account in all aspects of animal husbandry.

[1] Bennetts, H. W., *et al.* (1946.) *Austral. vet. J.* **22.** 2-12.
[2] Bodenheimer, F. W., & Salman, F. (1946.) *Ecology.* **27.** 255-256.
[3] Phillips, R. (1946 a, b.) *Nature, Lond.* **157.** 809 and **158.** 202.

NEW INSTRUMENTS AND APPLIANCES

'Columbus' Teat Plugs

H. W. STEELE-BODGER, M.R.C.V.S.
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Some six months ago a new type of teat bougie, manufactured in Denmark, was brought to my notice and my opinion was asked as to its merits or demerits.

The plug or bougie, which is only 1½ in. long, consists of a stem of pliable intertwined wires with which are twisted a number of transverse soft threads so that a brush-like body is produced. The plug is sterilized and ready for use covered with a disinfecting ointment which is also claimed to possess healing qualities. Nevertheless, the writer usually dips the bougie either into sterile sulphanilamide powder, or into an emulsion of cod-liver oil and sulphanilamide. To facilitate insertion and removal, one end of the plug is provided with a loop and the other end is provided with a knob.

Each plug is used only once, and after each milking a new one is inserted. Due to the fine intertwined threads, it is much less likely to fall out, and its slenderness ensures that the sphincter will never be over dilated.

The writer has found these bougies to be especially useful in cases of trodden teat ends, 'black spot' infection, or following operations on or around the sphincter; indeed, on a number of occasions, it is believed that they have obviated the necessity for an operation. After removal of the plug it has been found possible to milk out the quarter in conditions which would formerly have necessitated the use of a milk tube. In the writer's view these teat plugs are preferable to any other type previously employed, but their value is limited to the lower regions of the teat.

[The Holborn Surgical Instrument Co., Ltd., 26, Ely Place, Holborn Circus, London, E.C.1, inform us that they have for disposal for interested practitioners a limited number of sample boxes of the 'Columbus' teat plugs.—*Editor.*]

ATTESTED CATTLE AT AGRICULTURAL SHOWS

The Ministry of Agriculture has issued to organizers of agricultural shows a reminder that cattle from attested herds which are exhibited at a show or similar event may return to their home premises without isolation requirements, provided that the arrangements for the accommodation of attested cattle at the show conform to certain conditions and are approved by the Ministry before the event takes place.

Details of the Ministry's requirements may be obtained by show secretaries in England and Wales from the Secretary, Ministry of Agriculture and Fisheries, 99, Gresham Street (second floor), London, E.C.2, and in Scotland from the Secretary, Ministry of Agriculture and Fisheries (Animal Health Division, Scottish Branch), St. Andrew's House, Edinburgh, 1. Early application is advisable.

CLINICAL COMMUNICATIONS

Soluthiazole* as Curative Agent for a Husky Cough Unascertained Origin in Pigs

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For the last few years we have been troubled in our experimental piggery with a disease of the respiratory tract which affected pigs of all ages, but was most prevalent in pigs between eight and 20 weeks old. The disease manifested itself by a hard bronchial cough, rather similar to that usually associated with worms in pigs. No worms, however, could be found on examination in any part of the digestive tract of the affected pigs and prophylactic treatment with 5 per cent. oil of chenopodium did not prevent the occurrence of the cough. A few pigs between the ages of eight and 15 weeks suffering from the disorder have died and two were killed for a diagnostic *post-mortem* examination. The live weight gain of most of the pigs once they passed the 15th week of their lives was apparently only very little affected, if at all, but there were a few pigs whose growth was appreciably slowed down. The most critical period from the point of view of live weight gain was between weaning and approximately the 15th week, and the disorder was definitely at its worst during the cold season of the year. As far as our piggery was concerned the main trouble was really caused by interference with normal experimental routine, but we have now good reason to believe that the undefined husky cough is present in many commercial piggeries and might be a cause of a substantial economic loss.

Although in our piggery the sick animals remained in the same pens as healthy ones without the latter becoming affected, the disease usually spreads throughout the piggery affecting, in a fairly short space of time, animals newly brought in.

Post-mortem examination findings were restricted to the lungs, which usually showed a moderate or severe patchy pneumonia with consolidation, slight fibrinous pleurisy being associated with these areas. On *bacteriological examination* a pure growth of the *Pasteurella septica* was recovered on a number of occasions. (Anti-plague serum injected into coughing animals did not, however, overcome the disorder.) In a few cases there was also present an organism of the *Haemophilus* group. Its presence suggested the possibility that the swine influenza virus might also be present, and material from the lung lesions of seven pigs that died was inoculated intra-nasally into ferrets in an attempt to demonstrate the presence of this virus, but without success.†

In a recent clinical communication in *The Veterinary Record* (**58.** 447), O. V. Gunning reported a case of "parasitic bronchitis in calves associated with an infection of the lungs with an organism resembling *Bacillus actinoides*." He states that on advice from Messrs. May & Baker Ltd. he treated some of the cases with soluthiazole given intravenously, with spectacular results. As this communication coincided with a very severe outbreak of coughing in our piggery it was decided to apply the treatment to the affected pigs.

Initially, six of the most severely affected pigs were given soluthiazole, subcutaneously behind their ears, the dose being 5 c.c. of the solution per 10 lb. body weight.‡ The full strength solution was diluted by its own volume of sterile distilled water to prevent a possible undesirable local reaction. The initial parenteral dosage was followed by two daily doses of "M. & B. 693" —sulphapyridine, by mouth, in a dosage of 1 g. per 40 lb. body weight.

The effect of the treatment was striking. The pigs stopped coughing within two to four days after the injection. Following this experience all other pigs in the piggery which had been seen coughing were given the soluthiazole treatment, 38 altogether. Their live weight varied from 30 to 145 lb. While the smaller pigs were given the whole dose in one injection it was found convenient to give the larger pigs two injections, one behind each ear.

The pigs again responded to the treatment. In a number of cases, however, after an initial improvement the cough re-appeared within a few days. All these pigs were given another injection of soluthiazole, which was not followed by any oral treatment. Eight pigs were given the repeat treatment and all but one stopped coughing.

On the whole, the soluthiazole treatment was found to be effective in curing the husky cough whose origin remains still obscure. We are continuing our efforts to arrive at a complete diagnosis but in the meantime we thought this interim report might be useful in indicating a possible cure of a disorder which is prevalent in commercial piggeries.

Acknowledgment.—I would like to acknowledge with thanks the help given by Dr. N. S. Barron, M.R.C.V.S., and Mr. F. R. Spratling, M.R.C.V.S., whose advice and assistance on many occasions was very helpful indeed.

* Soluthiazole is a proprietary name for disodium $\alpha:\gamma$ (or $\alpha:\beta$) disulphonate of 2-[p-(γ-phenylpropylamino) benzenesulphonamido-thiazole].

† Pathological examinations were carried out at the Research Institute in Animal Pathology, Royal Veterinary College, and my thanks are due to the Director, Professor T. J. Bosworth, for assistance given.

‡ The soluthiazole was kindly put at our disposal by Messrs. May & Baker Ltd.

* * * * *

Multi-cystic Uterus *

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and
DIANA CAMPBELL, M.R.C.V.S.
Norwood, S.E.24

Subject.—Chow bitch, 10½ years of age.

History.—This bitch was operated on for Caesarean section six years ago. Two years ago a large mammary tumour was removed from the hindmost gland on the right side. When this bitch was first seen, there was a large hard tumour in the hindmost left mammary gland.

16.9.46. Injection of 50 mgs. stilboestrol was given followed by an oral dose of 2 mgs. *t.i.d.* for a fortnight.

25.11.46. Mammary tumour examined and found to be slightly smaller. The injection of stilboestrol was repeated and oral administration recommenced.

6.12.46. Called at night to see dog which was vomiting. The animal presented all the symptoms of an acute pyometra and it was decided to operate the next morning.

7.12.46. The bitch was anaesthetized by injection of 4 c.c. of a solution containing 5 per cent. morphine and 0·5 per cent. hyoscin. This produced light anaesthesia which was implemented by the administration of oxygen ether. Incision was made mid-line and the abdomen opened in the usual way. It was expected that the uterus would be large and distended and containing pus, but this proved not to be the case. The uterus was only slightly larger than normal and both this organ and the ovaries were covered by a large number of cysts, there being 73 on the left horn and ovary and considerably more on the right. The ovaries and uterus were removed in the usual manner and the abdominal cavity closed There was very little haemorrhage.

* Case report presented to the January, 1947, meeting of the Central Veterinary Society.

When the uterus was subsequently incised it was found to contain a clear, pink, blood-tinged fluid and at the vaginal end, a small amount of thin pus.

Shortly after being taken from the table the bitch exhibited signs of collapse and twelve ounces of glucose saline were administered subcutaneously, followed by the intramuscular injection of one ampoule of coramine.

8.12.46. The dog had recovered from the anaesthetic but was unwilling to move or to take nourishment. The heart was auscultated and found to be rapid, pulse thready, respiration rate up and temperature 103°; 6 c.c. of L.S.F. (Burroughs Wellcome) was injected and the animal put on to three tablets daily, each containing digitalis, strophanthin, belladonna and glyceryl trinit. A further eight ounces of glucose saline were injected.

11.12.46. Dog still unwilling to move about, but eating well. Temperature 102·4°. Mammary tumour hot and much enlarged. The tumour was incised and a large quantity of pus drawn off.

13.12.46. Tumour not discharging but granulating healthily. Temperature normal, animal eating. There was a large swelling on the neck, running down the left-hand side almost to the shoulder. This was explored with a needle and found to contain pus. The abscess was opened and drained and packed with sulphanilamide tulle.

19.12.46. Sent for at 9.30 p.m.—animal very ill. On examination, found animal comatose, respirations nearly 300 per minute, pulse full and bounding, temperature 106·6°. A diagnosis of generalized septicaemia was made. Penicillin was obtained and 12,500 units administered. Within 20 minutes the temperature had dropped to 103·4° and the respirations to 108. A further injection of 12,500 units was given and it was decided to administer this dose every three hours until a total of 100,000 units had been given.

20.12.46. Animal eating well but temperature still fluctuating between 102·5 and 104°. It was decided to give the penicillin at the rate of 20,000 units at three-hourly intervals and observe.

At this point, the owner informed us that he was personally acquainted with Sir Alexander Fleming and asked if we would care to have his advice. Sir Alexander was contacted by telephone and advised us that it was impossible to give too much penicillin and that an overdose could at the worst only lead to a wastage of the drug. He said that 50,000 units was a stiff dose for a dog of this size but in view of the condition suggested a dose of 100,000 units followed by an injection of 50,000 units every five hours for 50 hours. He further stated that there would be little if any difference in the result obtained by either subcutaneous or intramuscular injection although he favoured the latter route.

24.12.46. Dog well, eating particularly well but temperature still fluctuating between 102·8 and 103·4°. The breathing was difficult and shallow. It was decided to obtain a further opinion. Professor McCunn was kind enough to come and give us the benefit of his advice. Auscultation revealed a slight tubal pneumonia. In view of the large dosing with penicillin he advised us not to give sulphapyridine and that as the animal was in a low state a stimulating medicine should be administered and natural spontaneous recovery be allowed to take place. The medicine recommended was a three times daily dose containing grs. 4 ammon. carb. and minims. 5 of tinct. nucis vom.

27.12.46. Dog re-examined and found to be normal, taking exercise and eating well.

30.12.46. Dog visited, checked over.

2.1.47. Dog visited, checked over and discharged as cured.

Our thanks are due particularly to Sir Alexander Fleming for his kindness in giving us his advice regarding the use of penicillin. Also to Professor McCunn for advice and help.

We also wish to thank Messrs. Glaxo, the makers of the penicillin sodium used; Mr. Peter Sharp for taking photographs, one of which is reproduced.

"SWINE REQUIRE SALT"

Two groups of swine, each comprising 14 animals as nearly identical in age, size, weight and condition as selection could make them, were fed identical rations at the Purdue Agricultural Experiment Station, except that one group received no salt while the other received salt free choice.

Gains in the group fed no salt cost $12·53 for feed per 100 pounds. In the other group the cost of feed per 100 pounds gain was $8·68 plus approximately 1 cent for salt, a net saving of $3·83 per 100 pounds gain from the addition of salt to the ration.—*Vet. Med*

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F.A.O. Executive Committee meeting in Rome have agreed to the Preparatory Commission's recommendations, which include the setting up of a World Food Council. Final decision will be taken at F.A.O. conference in Geneva in August.

ABSTRACTS

[Studies on Corynebacterium Renale. I—A Systematic Study of a Number of Strains. Lovell, R. (1946.) *J. comp. Path.* **56**. 196-204. **II—The Experimental Pathogenicity for Mice.** Lovell, R., and Cotchin, E. (1946.) *J. comp. Path.* **56**. 205-214.

I.—A specific cystitis and pyelonephritis of cattle characterized clinically by the passage of turbid or blood-stained urine is recognized in Europe and America. The organism commonly associated with this condition is *Corynebacterium renale*. It is generally accepted as being a large Gram-positive diphtheroid with metachromatic granules. It has feeble fermentative capabilities, glucose alone being attacked. When grown on 10 per cent. milk agar its colonies are surrounded by a zone or halo of clearing; this reaction is of great value when isolating the organism from animal tissues. It produces a characteristic alkaline change in litmus milk in from seven to ten days, the casein being digested to form a granular deposit and leaving a clear burgundy-coloured supernatant fluid. *C. renale* is capable of splitting urea as judged by the formation of alkali in broth containing 1 per cent. of urea. It is positive to both the methyl red and Voges-Proskauer tests. The bulk of the strains tested by the author appear to be serologically related using precipitin tests with acid extracts as antigens. The organism is accepted as having but little pathogenicity for laboratory animals but it is pathogenic for mice provided adequate doses are inoculated intravenously.

II.—The main enquiry undertaken in this study was to determine whether *C. renale* might have a selective action on the kidney and bladder of the mouse. For this purpose histological and bacteriological examinations were made. The strain employed was isolated from a typical case of bovine pyelonephritis. It conformed to all the criteria which are characteristic of *C. renale* (see above). Eight-week-old mice weighing between 15 and 20 grammes were used. Both male and female mice were inoculated, as far as possible in equal numbers.

The sequence of events following intravenous inoculation when approximately 20 by 10^6 organisms were given was first studied. Although no estimates of the numbers of organisms present in the organs were made, it was clear that there was multiplication of *C. renale*, the numbers in the kidney increasing from about the third day and reaching a maximum about the seventh day; there was a marked decrease by the 14th day. In the urine the maximum concentration occurred later, reaching its height between the 10th and 14th days. Twelve of the 50 mice used in this experiment died between the third and twelfth days and all had severe kidney lesions. The earliest and main lesions developed in the renal papillae and were chiefly papillitis, pyelitis and pyonephrosis with a spread of inflammation down the ureter and into the perirenal tissue. Organisms were first seen clumped in capillaries near the apex of the papillae. A local polymorphonuclear reaction quickly followed giving rise to small abscesses often just beneath the visceral pelvic epithelium. Pus was seen in the renal pelvis as early as 30 hours after inoculation of the bacteria. Necrosis of the tip of the papilla was followed by an extension of the process back towards the medulla, sometimes involving the whole width of the papilla. There was no cortical involvement.

In a further experiment the fact that *C. renale* does multiply in the kidney was confirmed by estimating the numbers of organisms actually present in the organs of mice killed at intervals after intravenous inoculation with 22·8 by 10^6 viable organisms prepared from a six-hour broth culture. Thus after four days the kidneys contained an average of 166 by 10^6, after ten days 600 by 10^6 and after 14 days 3,300 by 10^6 organisms.

Inoculation of mice with 14 by 10^6 organisms by various other routes—intraperitoneal, subcutaneous and *per vaginam*—were generally unsuccessful, as was an attempt to transfer infection by contact between infected and healthy mice. Seven guinea-pigs killed from one to 14 days and five rabbits killed from two to 15 after receiving 60 by 10^6 organisms intravenously appeared to be refractory to infection. *C. renale* could be propagated on the chorio-allantoic membrane of the developing egg with invasion of the allantoic fluid and the embryo. On the third and fourth days following inoculation the membrane was thick and oedematous with a dryish central plaque but the embryos were still alive and free from lesions.

The experiments suggest that haematogenous infection of the kidneys is possible in mice. Whether this applies to cattle is an open question.

J. S. P.

[**Experiments with Jaagziekte.** Dungal, N. (1946.) *Amer. J. Path.* **22.** 737-759.]

In Iceland, as elsewhere, jaagziekte occurs naturally only in sheep; no cases have been seen there in goats, cattle, or humans exposed to the disease, and it cannot be transmitted experimentally to rats, mice, or guinea-pigs. The disease could be transmitted to healthy sheep by housing them with sick ones. The infective agent appeared to be absent from the faeces and urine, and was apparently not transmitted by *Melophagus ovinus*. The infective agent was apparently present in the expired air of affected sheep and could be "trapped" by allowing sick animals to breathe out through saline containing 20 per cent. glycerine as, both before and after filtration, this solution was capable of reproducing jaagziekte in a proportion of cases when injected into the trachea and lung of healthy sheep.

Experimental inoculation using filtered or unfiltered material from diseased lungs gave positive results on a few occasions only in a large number of trials: the affected tissue may thus contain a virus-neutralizing factor. Transfusion of blood from sick to healthy sheep, or inoculation of the watery discharge from the bronchi, gave negative results. No evidence was obtained experimentally that lungworms (*Muellerius capillaris*) were vectors of the infective agent, but it was possible that these worms, and also the bacteria commonly present in affected lungs, enhanced the action of the infective agent and facilitated its initial development in the lungs.

Photomicrographs are reproduced to draw attention to the presence of minute particules, just visible at the highest magnification, in smears stained by Giemsa's, Paschen's, or Castenada's stains: these particles, which may represent the causal organisms, are found in the cytoplasm of desquamated alveolar cells and in columnar cells from the bronchial tree and from the characteristic adenomatous tissue.

It is concluded that jaagziekte is due to a pneumotropic virus which is strictly limited to the lungs and bronchi of sheep and excreted in the expired air.

E. C.

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[**Comparative Growth of the Sheep and Bovine Animal during Prenatal Life.** Green, W. W. (1946.) *Amer. J. vet. Res.* **7.** 395-402. (1 plate and 6 figs.).]

The author, using previously published data of the bodily measurements, has compared relative and absolute rates of intrauterine growth of the lamb and calf. The relative measurements were obtained by expressing the measurement in question as a percentage of the measurement for the latest group of data (140-day lamb and 260-day calf). This percentage was compared with the percentage of the whole gestation period (150 days for lamb and 280 days for calf) which had elapsed, the comparisons being illustrated by means of graphs. Other graphs are given plotting the relative growth rates of different parts of the body against one another. All show a great similarity for the two species. The author considers that irregularities in the curves for cattle are due to the fact that measurements for cattle were taken on only one foetus per age interval and that the cows were of divergent genetic backgrounds, while those for sheep were based on three to seven specimens per age interval. A comparison of the absolute growth rates in the two species, based on values for weight and five body measurements, also showed great similarity up to the foetal age of 140 days in the lamb and 160 days in the calf.

J. W. D.

Veterinary Educational Trust

At the end of March Dr. W. R. Wooldridge relinquished his post at the London School of Hygiene and Tropical Medicine in order to take over the scientific direction of the Veterinary Educational Trust in a full-time capacity. The new offices of the Trust are situated at 232-3-4-5, Abbey House, Victoria Street, S.W.1.

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Weekly Wisdom

—Which reminds me of a veterinarian I knew on Guadalcanal. They requested him to condemn some grain for weevils. He said he had no jurisdiction over the flour. However the weevils were animals and unfit for food. Therefore he could condemn the weevils.—R. C. McCornack, D.V.M., *N.A. Veterinarian.*

be necessary for the Department of Health, in consultation with the Department of Agriculture, to pay a good deal of attention in the immediate future to the training of those who, with tact and knowledge, are to advise the dairy farmer on hygienic methods of milk production.

REVIEWS

The Dairy Shorthorn

This is an attractive booklet, well produced and illustrated, issued by the Shorthorn Society, mainly for the guidance of those intending to start dairying, but it contains a good deal of information, written in a simple way, of value to the veterinary or agriculture student.

There are three main sections dealing respectively with the history of the breed, breeding methods, and hints on building a herd. The veterinary reader will feel that the third section could have been improved by including greater reference to the importance of freedom from disease in purchasing foundation stock.

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[**"The Vagabond" and Other Poems.** By J. M. Armfield. Pubd. Whitcombe and Tombs, Ltd., 3-4, Addle Mill, Carter Lane, London, E.C.4. 3s. 6d.]

This journal is always delighted to notice activities of members of the profession in fields outside their statutory ones. Veterinary devotees of the poetic Muse are comparatively rare.

Mr. Armfield reveals a facile lyric gift, but his collection of some 40 poems would have benefited by a stricter censorship on the part of the author. He must guard against bathos, and too easy a satisfaction with the first flow of inspiration. However, all in all, one can derive considerable pleasure from reading through this little volume of verse.

TESTING OF MILK

The following annotation on the above subject appears in the issue of *The Lancet* of March 22nd:—

Milk testing is not an end in itself. When any new official test is introduced we have to consider not only its objects and method but also the action to be taken on the results. In announcing (circular 17/1947) a new method—or rather the modification of an older one—for testing non-designated milk, the Department of Health for Scotland makes the object and method clear but is less definite about subsequent action.

The object is strictly limited to the discovery of supplies of milk of poor keeping quality (pathogenic contamination is not dealt with), and the method is a variation of the Hiscox modification of the methylene-blue test. To pass the test, milk, to which has been added, within one hour of the arrival of the sample in the laboratory, a small quantity of methylene blue, must *not* decolorize this dyestuff by 12 noon on the day after the sample has been taken, the milk and dyestuff being held, meanwhile, at atmospheric shade temperature.

There is little doubt that this procedure gives a much better idea of the keeping quality of the milk—and perhaps also a rather better idea of the cleanliness of production and handling—than the methylene-blue test at 37° as used at present for designated (accredited or tuberculin-tested) milk in England and Wales. It has the same advantages over the resazurin tests now used for both designated and non-designated milk in the National Milk Testing and Advisory (N.M.T. & A.) scheme. Perhaps it is no objection to the new procedure to say that unlike the ten-minute resazurin test of the N.M.T. & A. scheme it cannot in any way be employed as a rejection test—*i.e.*, a test by which a consignment of milk of really poor quality can be spotted *quickly* and prevented from contaminating, and very possibly spoiling, a larger bulk at a collecting depot. The new test will undoubtedly serve as a sound basis for advisory work to the producer, which is its purpose under the new Scottish scheme; but certainly there are advantages in having one which serves both purposes—*i.e.*, as a platform rejection test and as a basis for advising the ignorant, or warning the careless, producer. The ten-minute resazurin test, or a 15-minute methylene-blue test at 37°, meets both requirements fairly well.

If, however, experience in England with the N.M.T. & A. scheme is applicable to Scotland, it may well be found that the factor limiting the usefulness of the test will not be the testing and laboratory end, but the paucity of competent staff available, particularly during the summer months, for speedily giving advice to the farmer whose milk is below standard. It is to be hoped that, with the lower average summer temperature in the northern half of Britain, the difficulties arising from the sheer weight of advisory work in the early days of this scheme will be less acute than those, fortunately now overcome, that impeded the N.M.T. & A. scheme in England in its first two or three years. But if the Scottish scheme is to be successful from the beginning, it may

(Concluded at foot of previous column)

IN PARLIAMENT

Penicillin Bill in the Lords

Lord AMMON in the House of Lords on March 18th formally moved the Second Reading of the Penicillin Bill.

Lord LISTOWEL, for the Government, said its purpose was to control the sale and supply to the public of penicillin or any substance with similar properties. The Bill would prevent such drugs and preparations reaching the public unless supplied or sold by a doctor, a dentist, or a veterinary surgeon, or by a chemist acting on a prescription drawn up by such a person. The production of penicillin had steadily inceased and there was now enough for all medical purposes at home, leaving some for export. There was no longer any justification for continuing to enforce Orders under the Defence Regulations which had been authorized by Parliament to conserve a limited supply of this drug. Before deciding whether penicillin should be sold freely and without restriction or should be subject to some new statutory control the Government consulted Sir Alexander Fleming, Professor R. V. Christie, Colonel L. W. Harrison, and Sir Philip Panton. Their unanimous opinion was that unrestricted access to penicillin would do grave injury to the public health. The most serious danger would arise when a patient took too small a quantity. This caused germs to lose their sensitivity to penicillin. People who acquired this immunity to penicillin would not only harm themselves but would be a danger to their families. The temptation to self-treatment or to amateur treatment in venereal disease to avoid publicity would be almost irresistible if penicillin could be obtained at any retail shop or store. The results would be injurious to health. This again would add to the grave difficulty of preventing the spread of diseases. The indiscriminate use of penicillin might also lead to dermatitis and ulcers of the mouth. In no other way than by legislation could the use of penicillin be effectively controlled. There would be no interference with the wholesale trade in these drugs and preparations, nor with the supply to doctors and surgeons, to hospitals and nursing homes, to bodies doing medical research, or to Government Departments. Clause 1 of the Bill set out the restrictions on the sale and supply of penicillin and other substances. It also provided exemption from restrictions where these drugs could change hands without prejudice to health. Subsection 3 of this Clause provided that the same prescription should not be used more than once, nor after three months, unless the person signing it directed otherwise. Clause 2 applied the Bill to penicillin and to such other substances prescribed in regulations made by the appropriate Minister after consultation with the Medical Research Council.

The Bill was considered in Committee by the House of Lords on March 25th. Lord DROGHEDA in the chair.

Lord MARLEY moved to insert, at the end of Clause 1, Subsection (2) (d), " under the direction of a fully qualified medical practitioner, a registered dental practitioner or a registered veterinary surgeon or a person acting in accordance with the directions of any such practitioner or surgeon."

He said that an unqualified or unregistered person might buy and use—that is to say administer—penicillin, provided that he was linked with another unqualified person or a so-called nursing home, hospital, clinic or other institution. This had caused some anxiety among doctors and veterinary surgeons. The matter had also been considered by the Parliamentary and Scientific Committee. He pointed out that in Clause 4 of the Bill the word " supply " included " administer by way of treatment," and therefore in fact the unauthorized persons, linked together under institutions such as nursing homes, dental or veterinary establishments, could buy and supply the drugs and also use them for treatment. He hoped that if the Government could not accept this very reasonable and simple amendment, they would explain why the gap had been left in the whole object for which the Bill was designed.

Lord BARNBY, as a member of the Parliamentary and Scientific Committee, supported the amendment.

Lord LISTOWEL, Postmaster-General, for the Government, said he had listened with sympathy, for the object of the amendment was to prevent institutions run by quacks from obtaining penicillin, but if Clause 1 were examined closely it would be seen that it became an offence for anyone who was not a qualified medical practitioner, registered dental practitioner, or registered veterinary surgeon, or person acting in accordance with their directions, to administer penicillin. Subsection (2) (d), turned only on supply to, and not supply by, a hospital, nursing home, or similar institution. In theory a nursing home or veterinary institution of doubtful reputation might be able to hold a supply of penicillin, but they could not lawfully use it for treatment on their patients, except in accordance with the directions of a qualified practitioner. The amendment would add a lot of red tape to the procedure which would be entailed each time an institution wanted permission to obtain a supply of penicillin and it would put obstacles in the way of genuine institutions.

Lord MARLEY expressed his dissatisfaction with Lord Listowel's explanation, but withdrew his amendment.

Clause 1 and the remaining clauses were agreed to, and the Bill was reported without amendment.

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Questions

Dog Distemper

Mr. VIANT asked the Minister of Agriculture whether he has any information about the recent epidemic of distemper during which many valuable dogs died; and whether the animals had been inoculated against the disease.

Mr. T. WILLIAMS: There has been an epidemic of distemper in recent months, such as occurs periodically, but as the disease is not required to be notified, I have no precise information of its extent. As regards the last part of the Question, I regret that I have no particulars.

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Hypomagnesaemia

Mr. J. MORRISON asked the Minister of Agriculture what information he has with regard to instances of hypomagnesaemia amongst cattle in this country; what number are estimated to have died from it in the last six months; and what steps are being taken to conduct research on this disease.

Mr. T. WILLIAMS: Some hundreds of cases of hypomagnesaemia in cattle in this country have been reported to my Department by veterinary practitioners during the last six months, but as the disease is not compulsorily notifiable I have no actual figures either of its incidence or of fatal cases. Research into the disease has been carried out for several years at the Veterinary Laboratory of my Department at Weybridge and the results of this research, which has yielded a successful treatment, have been published from time to time in veterinary journals.

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Farm Buildings (Committee's Proposals)

Mr. VANE asked the Minister of Agriculture what progress has been made towards implementing the recommendation in the report of the Committee on Farm Buildings, Post-war Building Studies No. 17, published in 1945, that his Department should discuss with the manufacturers the mass production of standard framed buildings of certain suggested dimensions.

Mr. T. WILLIAMS: The recommendations of the Farm Buildings Committee are being followed up by a committee of the Agricultural Improvement Council under the chairmanship of Sir Frank Engledow. The preliminary proposals of this body for securing the mass production of standard framed farm buildings have now been received and are being given urgent consideration.

NOTES AND NEWS

Diary of Events

April 8th.—Meeting of the Zoological Society of London at Regent's Park, N.W.8, 5 p.m.

April 9th.—Meeting of the Editorial Committee, N.V.M.A., 36, Gordon Square, W.C.1, 2.30 p.m.

April 9th, 10th and 11th.—Quarterly Meetings of Council, R.C.V.S., 10, Red Lion Square, W.C.1.

April 11th.—Meeting of the Biochemical Society at the Rowett Research Institute, Bucksburn, Aberdeen, 2.30 p.m.

April 12th.—Meeting of the Association of Veterinary Teachers and Research Workers, at the Royal Veterinary College, N.W.1, 11 a.m.

April 14th.—Meeting of the Farmers' Club at the Royal Empire Society, London, 2.30 p.m. [Mr. H. H. Nicholson, of Cambridge: " The Problem of Land Drainage."]

April 16th.—Meeting of the Scottish Branch, N.V.M.A., at Stirling (Golden Lion Hotel), 2.30 p.m.

April 18th.—Yorkshire Division, N.V.M.A., Dinner and Dance at Leeds (Guildford Hotel). 7.30 p.m.

April 23rd.—Meeting of the South-Eastern Division, N.V.M.A., at Tunbridge Wells (Mount Ephraim Hotel), 2.30 p.m.

May 7th.—Special Meeting of the N.V.M.A. Technical Development Committee, at 36, Gordon Square, W.C.1, 11 a.m.

May 23rd.—R.V.C. Students' Union Society Annual Ball, Grosvenor House, Park Lane, W., 8 p.m. to 1 a.m.

July 28th—Aug. 1st.—N.V.M.A. Annual Congress in Edinburgh.

Practitioner Sufferers from the Floods

N.V.M.A. Council's Expression of Sympathy

At the meeting of Council, N.V.M.A., held on Wednesday of last week, the members were grateful to one of their number who, in a few moving words, voiced the feeling of deep sympathy felt universally throughout the profession for those practitioners in the Fen and other districts so disastrously affected by the recent "cruel succession of blizzards, gales and floods"—to quote the Lord Mayor in his recent National Flood Distress Fund Appeal. While commendation of this fund to the ready response of our readers is superfluous, they will unite with the Council in its expression of heartfelt concern for their fellow members in the immense measure of deprivation and difficulty in carrying on their professional work to which they have been subjected by a calamity which has brought such distress not only to many practitioners themselves but to their friends the farmers and other agricultural workers in the inundated areas.

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Agricultural Disaster Fund

The extent to which Britain's farmers sustained disastrous losses in the blizzards and floods is disclosed in a report of the National Farmers' Union, and an appeal is being launched to agriculture and its ancillary industries for contributions to its Agricultural Disaster Fund. The appeal does not cover the household or personal losses, which are the province of the Lord Mayor's appeal. A fully representative national committee is being set up to administer the N.F.U. Fund and donations should be sent to 45, Bedford Square, London, W.C.1.

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New Appointments to the Staff of the Ministry of Agriculture

As notified in recent issues, Council, N.V.M.A., has decided that no advertisements for appointments to the veterinary staff of the Animal Health Division of the Ministry of Agriculture shall be accepted for *The Veterinary Record* pending the settlement, in a manner satisfactory to the Association, of the question of the status and salaries of the Veterinary Officers of the Division.

In the meantime, any members of the profession who may, nevertheless, contemplate applying for such posts, should these be advertised elsewhere, are requested first to communicate with the General Secretary of the Association at 36, Gordon Square, London, W.C.1.

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Questionnaire to Divisions, N.V.M.A.

Honorary Secretaries of Divisions who have not yet replied to the General Secretary's letter of December 23rd are asked to treat the matter as one of urgency. They are reminded that, should they require further copies of the questionnaire for circulation to their members these are available, on request, from 36, Gordon Square, London, W.C.1.

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GENERAL OBITUARY

Sir Joseph Barcroft, C.B.E., M.A., F.R.S.

Fellow of King's College
and
Emeritus Professor of Physiology, Cambridge

The sudden death of Sir Joseph Barcroft, recorded in your last issue, leaves a gap that will be hard to fill, and his loss will be felt more acutely as time passes. During his busy life his interest centred round many problems, a number of which were outside the physiological field, and it is remarkable that at the age of 68, when he was appointed Director of the newly formed Unit of Animal Physiology,* he applied himself with an enthusiasm to the problem of ruminant digestion, a subject with which he had had no previous acquaintance.

As a man he was a charming personality and a friend to each member of his staff. As a director he was always ready to discuss any matter, and his clarity of thought was such that he was able to reduce a physiological tangle to its simplest terms, making the important problem perfectly clear. Perhaps his most stimulating characteristic was his complete lack of academic pompousness; a characteristic which could not fail to have a beneficial influence on those who came in contact with him.

In spite of his age he was actively engaged in research until the day of his death. Every year he carried out an intensive programme of research on the physiology of the foetus in which he performed the operative work himself, and he kept many workers in many departments of the University and elsewhere busy during the first few months of the year. Few men can claim to have performed experimental work for so many years.

His ability to improvise and to get work done under conditions that would have daunted most men was remarkable. Lack of facilities or equipment was merely a matter to be settled by the exercise of a little 'grey matter.' He had a great respect for apparatus, and anyone who did not share this respect was soon made to mend his ways. He was content to allow those working under him to develop their own ideas in their own way, and by doing so he accumulated workers who came to him from all over the world. He was always anxious to help young research workers and he was regarded by them as a man who would give advice and help freely to their best interests.

The value of his experimental work is unquestioned, and his work on foetal physiology and ruminant digestion will have a direct and important bearing on veterinary problems. Apart from his experimental work the legacy he has left in his teaching of the experimental approach is invaluable, and his influence in veterinary physiology will be felt for many years to come. It was a privilege to work with him, a privilege that will not be forgotten.

A. T. Phillipson,
Unit of Animal Physiology,
Cambridge.

*The Unit was started in 1941 and not, as stated in *The Veterinary Record* of March 29th, in 1942.

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PERSONAL

Appointments.—The following appointments to the Sudan Veterinary Service have recently been made: Mr. C. L. Williams, M.R.C.V.S., Veterinary Inspector; Mr. C. N. Chappel, M.R.C.V.S., Veterinary Inspector.

The London, Midland and Scottish Railway has appointed Mr. V. B. Jones, M.R.C.V.S., District Veterinary Surgeon, Camden, to be District Veterinary Surgeon and Horse Superintendent, St. Pancras.

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Birth.—Lauder.—On March 24th, 1947, at Timperley Lodge Nursing Home, Altrincham, to Margaret Julia, wife of J. S. J. Lauder, M.R.C.V.S., a daughter, Judith Alison.

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NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY

We are informed by Major Hopkin, Hon. Secretary of the National Veterinary Benevolent and Mutual Defence Society, that at the annual general meeting held on March 19th the new rules, copies of which have been circulated to all members, were unanimously adopted. It was further decided that these should come into operation forthwith. In order that members may be entitled to the extended benefits it is essential that the Application Forms already in the hands of members be returned immediately to the Hon. Secretary.

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INCREASED ALLOWANCES FOR PIGS AND POULTRY

In announcing on February 17th last the Government's policy for an increase in the production of livestock and livestock products the Minister of Agriculture and Fisheries stated that it was hoped to secure increased supplies of feeding-stuffs later in the year and that it was intended to devote a large proportion of any such increase to improvements in the ration for pigs and poultry. Larger supplies are now expected to be available from May onwards, and (state the Agricultural Departments for England & Wales and Scotland) it has been decided to increase ration scales commencing on May 1st (except for autumn calvers) as follows:—

Basic Rations for Pigs and Poultry. During the period May to August inclusive, rations for commercial pigs and poultry will be issued, at the normal summer rate of 1 cwt. per pig and 14 cwt. per 20 poultry, for one-sixth (instead of one-eighth as at present) of the registered pre-war numbers subject to an acreage deduction of one pig for every 16 acres and three birds for every four acres of the holding (this is half the present acreage deduction).

Sound Poultry Breeding Stock. The supplementary allowance will be raised to 1 cwt. for every 18 fowls or 15 ducks or nine turkeys approved in the autumn, 1946.

Chick Rearing Rations. Additional rations sufficient to bring the total issue this year up to 1 cwt. for each 40 birds returned on June 4th, 1946, will be issued in coupons valid for May to August, 1947.

Farrowing Sows' Allowance. This allowance will be increased to 8 cwt. for each eligible sow or gilt due to farrow subject to the usual conditions.

Domestic Poultry. Domestic poultry keepers will be allowed 4 lb. of Balancer meal instead of 2 lb. per month for each shell egg registration surrendered.
Domestic Pigs. Domestic pig keepers will be allowed 56 lb. (instead of 28 lb.) of cereal per month for one pig.
Pig Club Rations. These rations will be raised from 42 lb. to 70 lb. per month for one pig.
Commercial and Domestic Rabbits. The ration allowed for breeding does will be restored to 7 lb. of bran per doe per quarter.
Autumn Calvers. This allowance will be increased to ¼ cwt. protein and 1½ cwt. cereal. Particulars of issue will be notified later.

Rations for other classes of stock, *e.g.*, dairy cows, calves, horses, goats, etc., will be at the same levels as last summer.

The announcement adds: "In view of these increases in rations, breeders of pigs and poultry are urged to take immediate steps to supply the improved demand that may be expected for young stock, while those farmers who gave up pig or poultry production during the war, but still have the necessary facilities, are asked to resume their former activities."

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Essex.—Coney Gray Farm, Wickford, Essex; Blunts Farm, Theydon Bois, Epping, Essex (March 25th).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents should write as briefly as possible and letters should not exceed 350 words.

INFECTIOUS FELINE AGRANULOCYTOSIS OR MALIGNANT PANLEUCOPENIA

Sir,—In the issue of *The Veterinary Record* of November 16th, 1946, I read the article on this subject. I should like to give the results I obtained when treating cats for endemic distemper.

In October, 1946, there was an outbreak of infectious disease among cats in Amsterdam. The symptoms were occasional vomiting for two days and refusal to eat or drink. There was slight redness of the larynx but no diarrhoea or other symptoms.

I studied the blood picture of 20 cases. Seven of these had hardly any leucocytes in their blood: up to 1,000 c.mm. Two recovered after treatment, the remainder died. I found the blood picture of normal cats to be: Total leucocytes, 12,200; eosinophiles, 1 per cent.; segmented neutrophils, 42·5 per cent.; lymphocytes, 53·5 per cent.; monocytes, 3 per cent.

It appears that the time of taking blood for examination is important. According to Lepine, changes occur within three to four hours. I saw three cases with a high proportion of segmented neutrophils before all the leucocytes disappeared, followed by death. Red cells were normal.

Of the 20 cats eight recovered, nine died and the fate of the remaining three is not known. Recovered cats had many young cells in the blood, stab cells and myelocytes. It appears to me that the lymphocytes disappear last; segmented forms return quickly.

The incubation period of the disease is about seven days. It is highly infectious and animals can be infected from human beings who are handling infected animals. Recovered animals are immune, and cats can also be immunized by the use of organ emulsion.

There were no symptoms of secondary infections such as rhinitis, conjunctivitis or enteritis.

Post-mortem findings showed the intestines to be normal or merely slightly reddened; spleen normal, bone marrow not fluid; other organs normal.

The majority of infected animals were three months old or over.

Treatment.—Two cases were treated with American serum; one reacted well and recovered, the other died. The English method of immunization is good, but the Dutch method does not give good protection although it lessens the severity of the disease. I have had good results with penicillin in oil and penicillin with adrenaline, but a cheaper and easier treatment is the use of *B. coli* serum, possibly together with physiological saline when the cat is dehydrated. For the best results give 10 c.c. to 15 c.c. of serum once, or in severe cases twice daily.

Owing to the rapid change of the blood picture it is impossible to forecast recovery or death.

Yours faithfully,

Small-Animal Clinic, E. J. VOUTE, JUNR.
Amsterdam.
February 19th, 1947.

DOSAGE WITH PHENANTHRIDINIUM COMPOUNDS

Sir,—In your issue of December 14th, 1946, you published a letter from me on the above subject, in which I commented on certain work published in the *Record* by Messrs. Randall and Beveridge.

In the course of my letter I stated, with regard to a claim that photosensitization had occurred in certain field work carried out by Mr. H. Cronly, M.R.C.V.S., following a dose of 2 mg. per kilo, that while associated with this work in Uganda I had not been able to satisfy myself that an error of dosage had not occurred by African assistants who computed the dose per lb. of body weight instead of per kilo.

Mr. Cronly has pointed out to me that I am entirely mistaken over this, since he himself estimated the weights of the cattle and checked the dose of solution given to every animal.

In these circumstances, he is not unnaturally aggrieved at this particular statement in my letter. I shall, therefore, be grateful if you will be good enough to publish this letter as a correction of my misstatement. At the same time, I wish to record a sincere apology to Mr. Cronly and to the authors in question.

Yours faithfully,

Central Veterinary Research Institute, R. N. FIENNES.
P.O. Kabete, Kenya.
March 21st, 1947.

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VICTORIA VETERINARY BENEVOLENT FUND LADIES' GUILD

Sir,—In the report of the meeting of Council, V.V.B.F., published in *The Veterinary Record* of March 22nd, it will be noted that as a result of a special Xmas appeal a sum of £226 was raised by the Ladies' Guild. The Committee (Ladies' Guild) would like to take the opportunity of expressing its thanks to the members who contributed so generously to this special appeal. The money collected was allocated to the Xmas fund and was distributed in sums of from £3 to £10.

The grants from the main fund made to members of the profession and their dependants who have fallen on evil times help to provide the bare necessities of life, but in most cases are insufficient to permit any extra comforts. We are sure that the ladies will feel amply repaid for their efforts when they read the following replies selected from the many received from the recipients of the gifts:—

"I do not know how to thank you all sufficiently for your great kindness in so generously sending me the cheque. . . . You are so good and kind to me I can only pray and hope for great blessings to come to all who have had part in making my declining years so comfortable."

"I received the wonderful gift of cheque on December 14th and I wish to thank all the members of the Ladies' Guild. I appreciate such kindness as indeed it will bring to me extra comfort and happiness at Christmas."

"I am deeply grateful to the Ladies' Guild for their generosity in sending such a great gift. Kindly convey my very deepest thanks and the same from my children."

"No words of mine can adequately express my heartfelt gratitude for all your kindness to me and my family since our heavy blow fell."

"I wish to thank the President and Ladies' Guild for the kind gift for Christmas. May they be rewarded for their thought and hard work in thinking of others less fortunate."

"Please accept my sincere and grateful thanks for the very generous Christmas gift. I assure you it will be a wonderful help to me and my little cripple boy."

The Committee appeals to all the ladies in the profession to redouble their efforts so that the splendid work which is being undertaken by the V.V.B.F. may be still further strengthened.

Yours faithfully,

DAISY I. GLOVER (*Hon. Secretary and Treasurer*).

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THE NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY

Sir,—May I, through your correspondence column, thank, on behalf of the Council, all those members of the profession, non-members of the Society as well as members, who have written letters of appreciation for the work the Council has done in preparing the new scheme of extended benefits. Thanks are also due to those members who have so generously offered to contribute to the Guarantee Fund. This Fund is still open for further offers.

The large number of letters received makes it impossible for me to answer each individually.

Yours faithfully,

35, Manchester Road. F. HOPKIN (*Hon. Secretary*).
Knutsford, Cheshire.
March 24th, 1947.